Science Framework for Conservation and Restoration of the Sagebrush Biome: Linking the Department of the Interior's Integrated Rangeland Fire Management Strategy to Long-Term Strategic Conservation Actions

Executive Summary

Editors: Michele R. Crist, Jeanne C. Chambers, Susan L. Phillips, Karen L. Prentice, and Lief A. Wiechman

Crist, Michele R.; Chambers, Jeanne C.; Phillips, Susan L.; Prentice, Karen L.; Wiechman, Lief A., eds. 2019. **Science framework for conservation and restoration of the sagebrush biome: Linking the Department of the Interior's Integrated Rangeland Fire Management Strategy to long-term strategic conservation actions. Part 2. Management applications.** Gen. Tech. Rep. RMRS-GTR-389. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 237 p.

Abstract

The Science Framework is intended to link the Department of the Interior's Integrated Rangeland Fire Management Strategy with long-term strategic conservation and restoration actions in the sagebrush biome. The focus is on sagebrush (Artemisia spp.) ecosystems and sagebrush dependent species with an emphasis on Greater sage-grouse (*Centrocercus urophasianus*). Part 1 of the Science Framework, published in 2017, provides the scientific information and decision-support tools for prioritizing areas for management and determining effective management strategies across the sagebrush biome. Part 2, this document, provides the management considerations for applying the information and tools in Part 1. Part 2 is intended to facilitate implementation of resource management priorities and use of management strategies that increase ecosystem resilience to disturbance and resistance to nonnative invasive annual grasses. The target audience of Part 2 is field managers, resource specialists, and regional and national-level managers. The topics addressed in this volume include adaptive management and monitoring, climate adaptation, wildfire and vegetation management, nonnative invasive plant management, application of National Seed Strategy concepts, livestock grazing management, wild horse and burro considerations, and integration and tradeoffs. Geospatial data, maps, and models for the Science Framework are provided through the U.S. Geological Survey's ScienceBase database and Bureau of Land Management's Landscape Approach Data Portal. The Science Framework is intended to be adaptive and will be updated as additional data become available on other values and species at risk. It is anticipated that the Science Framework will be widely used to: (1) inform emerging strategies to conserve sagebrush ecosystems, sagebrush dependent species, and human uses of the sagebrush system; and (2) assist managers in prioritizing and planning on-the-ground restoration and mitigation actions across the sagebrush biome.

Keywords: *sagebrush habitat, Greater sage-grouse, resilience, resistance, conservation, restoration, monitoring, adaptive management, climate adaptation, wildfire, nonnative invasive plants, National Seed Strategy, livestock grazing, wild horses and burros*

Cover photo: Sagebrush ecosystem in the Toiyabe Range, Nevada (photo: Jeanne Chambers, USDA Forest Service). Inset: Greater sage-grouse chick (photo: USDOI Fish and Wildlife Service).

Executive Summary

The Science Framework was developed by State, Federal, and university collaborators to provide a transparent, ecologically-defensible approach for making policy and management decisions to reduce threats to sagebrush ecosystems and sagebrush-dependent species, with an emphasis on Greater sage-grouse (GRSG). It is intended to be used by field-level resource specialists and practitioners, while providing a broader context for regional and national level managers. The Science Framework is directly linked to U.S. Department of the Interior directives and ongoing multipartner conservation efforts, such as the Sagebrush Conservation Strategy led by the Western Association of Fish and Wildlife Agencies.

The Science Framework presents a new management paradigm for agencies and managers that effectively increases the ability to manage multiple resources across scales and surface land management jurisdictions in an integrated and collaborative manner. Recent research has provided the basis for characterizing sagebrush ecosystems according to their ecological resilience to disturbance (ability to recover) and resistance to invasive annual grasses. This has enabled development of an approach that couples information on resilience and resistance with that on species habitats and threats to sagebrush ecosystems. This approach prioritizes conservation and restoration actions in those areas where they are likely to have the greatest benefits and helps determine the most appropriate management strategies.

Three different scales are used in the Science Framework to inform the different aspects of planning and implementation. These include: (1) the sagebrush biome scale, where consistent data for the range of sagebrush and GRSG inform budget prioritization; (2) the midscale (ecoregions and Management Zones), where assessments are conducted to further inform budgets and determine priority planning areas; and (3) the local scale, where local data and expertise are used to select project sites and determine appropriate management strategies and treatments within priority planning areas.

Part 1 of the “Science Framework for Conservation and Restoration of the Sagebrush Biome: Linking the Department of the Interior’s Integrated Rangeland Fire Management Strategy to Long-Term Strategic Conservation Actions” was published in 2017 and provides the **science basis and applications** for the multiscale approach used in both Part 1 and 2. Part 1 begins with a synthesis of the biophysical characteristics of sagebrush ecosystems and their key threats. The necessary information and methods for applying the concepts of resilience and resistance to sagebrush ecosystems are then provided along with the best available information on GRSG habitat. A geospatial process is illustrated for mapping information on resilience and resistance, GRSG habitat, and the dominant threats that can be used to prioritize the areas for management. A sage-grouse habitat resilience and resistance matrix is provided to help managers evaluate risks and determine appropriate management strategies. Part 1 concludes by discussing decision tools and management strategies for determining appropriate management actions for areas that are prioritized for management. The geospatial data, maps, and models are provided through the Bureau of Land Management’s (BLM) Landscape Approach Data Portal (https://landscape.blm.gov/geoportal/catalog/main/home.page) and the U.S. Geological Survey’s ScienceBase database (https://www.sciencebase.gov/catalog/).

Part 2 of the “Science Framework for Conservation and Restoration of the Sagebrush Biome: Linking the Department of the Interior’s Integrated Rangeland Fire Management Strategy to Long-Term Strategic Conservation Actions,” this

volume, focuses on **management considerations and tradeoffs** for applying the scientific information, geospatial analyses, and decision-support tools in Part 1. The information in Part 2 can be used by managers and stakeholders to help refine resource management priorities at the midscale, step down midscale priorities to the local scale, and then select the most appropriate management strategies. The emphasis of Part 2 is on key resource management topics, including monitoring and adaptive management, climate adaptation, wildfire and vegetation management, nonnative invasive plant management, application of National Seed Strategy concepts, livestock grazing management, and wild horse and burro considerations. Each management topic is a stand-alone section that provides the necessary considerations for effective management at mid to local scales, including the basis for identifying threats and prioritizing areas for management; the best available information on management options, effectiveness, and potential environmental consequences; and administrative realities. The last section discusses integration of the management strategies for the different topics and the associated tradeoffs in managing for diverse resources across large landscapes. Management scenarios and considerations of the tradeoffs help facilitate the development of appropriate management objectives and strategies for decision-making processes such as land management planning and alternatives for National Environmental Policy Act analyses.

The Science Framework, both Part 1and Part 2, is intended to be adaptive and will be updated to highlight additional management considerations as new science, analytical approaches, and information on focal species and habitats as they become available. These updates will be linked to periodic updates of the Western Association of Fish and Wildlife Agencies' Sagebrush Conservation Strategy, which is planned for release in 2019.

It is anticipated that the Science Framework will be widely used to: (1) inform emerging strategies to conserve sagebrush ecosystems, sagebrush-dependent species, and human uses of the sagebrush system; and (2) assist managers in prioritizing and planning on-the-ground conservation and restoration actions across the sagebrush biome. The concepts and approaches in the Science Framework have already been used by the Forest Service in developing fire risk assessments for all Forest Service lands with Greater sage-grouse and for the Intermountain Region. They were incorporated into the "Department of the Interior's Integrated Rangeland Fire Management Strategy" and have been used by the BLM to develop a multiyear program of work for BLM managed lands in the western part of the sagebrush biome.

Key References

Chambers, J.C.; Beck, J.L.; Bradford, J.B.; [et al.]. 2017. Science framework for conservation and restoration of the sagebrush biome: Linking the Department of the Interior's Integrated Rangeland Fire Management Strategy to long-term strategic conservation actions. Part 1. Science basis and applications. Gen. Tech. Rep. RMRS-GTR-360. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 213 p. https://www.treesearch.fs.fed.us/pubs/53983

Chambers, J.C.; Beck, J.L.; Campbell, S.; [et al.]. 2016. Using resilience and resistance concepts to manage threats to sagebrush ecosystems, Gunnison sage-grouse, and Greater sage-grouse in their eastern range: A strategic multi-scale approach. Gen. Tech. Rep. RMRS-GTR-356. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 145 p. https://www.treesearch.fs.fed.us/pubs/53201

Chambers, J.C.; Bradley, B.A.; Brown, C.A.; [et al.]. 2014. Resilience to stress and disturbance, and resistance to *Bromus tectorum* L. invasion in the cold desert shrublands of western North America. Ecosystems. 17: 360–375. https://www.treesearch.fs.fed.us/pubs/46762

Chambers, J.C.; Maestas, J.D.; Pyke, D.A.; [et al.]. 2017. Using resilience and resistance concepts to manage persistent threats to sagebrush ecosystems and Greater sage-grouse. Rangeland Ecology and Management. 70: 149–164. https://www.treesearch.fs.fed.us/pubs/53742

Chambers, J.C.; Pyke, D.A.; Maestas, J.D.; [et al.]. 2014. Using resistance and resilience concepts to reduce impacts of annual grasses and altered fire regimes on the sagebrush ecosystem and sage-grouse—A strategic multi-scale approach. Gen. Tech. Rep. RMRS-GTR-326. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 73 p. https://www.treesearch.fs.fed.us/pubs/46329

Crist, Michele R.; Chambers, Jeanne C.; Phillips, Susan L.; Prentice, Karen L.; Wiechman, Lief A., eds. 2019. Science framework for conservation and restoration of the sagebrush biome: Linking the Department of the Interior's Integrated Rangeland Fire Management Strategy to long-term strategic conservation actions. Part 2. Management applications. Gen. Tech. Rep. RMRS-389. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 237 p.

Doherty, K.E.; Evans, J.S.; Coates, P.S.; [et al.]. 2016. Importance of regional variation in conservation planning: A range-wide example of the Greater sage-grouse. Ecosphere. 7: Article e01462. https://doi.org/10.1002/ecs2.1462

Maestas, J.D.; Campbell, S.B.; Chambers, J.C.; [et al.]. 2016. Tapping soil survey information for rapid assessment of sagebrush ecosystem resilience and resistance. Rangelands. 38: 120–128. https://www.treesearch.fs.fed.us/pubs/52452

U.S. Department of the Interior [USDOI]. 2015. An Integrated Rangeland Fire Management Strategy. Final Report to the Secretary of the Interior. Washington, DC: USDOI. 82 p. https://www.forestsandrangelands.gov/rangeland/documents/IntegratedRangelandFireManagementStrategy_FinalReportMay2015.pdf. [Accessed Sept. 12, 2018]. 82 p.

To learn more about RMRS publications or search our online titles:

www.fs.fed.us/rmrs/rmrs-publishing-services

www.fs.usda.gov/treesearch